DRAFT ERAC Summary for the Board to be included in the Report to the Legislature October 5, 2006

Introduction

There was a preliminary meeting of Board of Pesticides Control (BPC) staff, University of Maine Food Chemical Safety Laboratory personnel and the executive director of the Maine Lobstermens' Association on April 12, 2006 where the 2006 monitoring plan for ground applications to control the Browntail moth was discussed. The goal of this project was to collect data to help determine whether a buffer between pesticide target areas and marine water bodies or other mitigation steps are needed to prevent unreasonable pesticide drift into these natural resources.

This study was a cooperative effort and we would like to thank the following participants:

> The arborist from the participating four tree companies, their applicators and their coastal clients. The applicators were assured that no enforcement action would taken as a result of this study and that company and applicator names would be absent from reports.
>
> The Maine Lobstermens' Association for providing funding for analytical reagents
>
> The Food Chemical Safety Lab at the University of Maine for providing chemical analysis *pro bono*
>
> The BPC staff for collecting the samples and employing a chain of custody procedure

The insecticides applied were two synthetic pyrethroids, permethrin (Astro, EPA # 279-3141) and cyfluthrin (Tempos SC 432-1363). These products have label directions intended to reduce drift and exposure to aquatic organisms. That language is summarized in Table 1.

Methods

Pesticide applicators from each of the four participating tree companies chose properties bordering the ocean to be monitored by BPC. BPC staff was on site prior to and at the time of the applications. The sampling protocol called for duplicate or triplicate drift cards as the sampling units, dependent on field conditions. Because of the geography of the sites (size of property, proximity to neighboring properties and canopy cover) triplicate drift cards were not always used. Samples at the same distance from the target were designated "a" or "b" and were placed approximately 25 ft apart to account for wind variability. No drift cards were collected from the target area. The details of the monitoring study are found in Heather Jackson's **DRAFT - 2006 Monitoring of Pesticide Drift from Applications to Control Browntail Moth (agenda item 7)**. Summaries of the application and weather conditions are found here in Tables 2 and 3. Table 2. contains information on the permethrin applications (Harpswell 1 & 2 and Freeport) and Table 3. contains information on the cyfluthrin applications (Falmouth and Yarmouth).

Table 1. Product Summaries and Environmental Hazard Statements for Astro (Permethrin) and Tempo 2 (Cyfluthrin)

Product Summary	Environmental Hazard Statements
Product: Astro Permethrin 36.8% 3.2 lbs/gal EPA # 279-3141 **Methods:** Ground **Site:** Ornamental trees	This pesticide is extremely toxic to fish and aquatic invertebrates. Do not apply directly to water or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not apply where runoff is likely to occur. Do not apply when weather conditions favor drift from treated areas. Drift and runoff from treated areas may be hazardous to aquatic invertebrate organisms in neighboring areas. Do not contaminate water when disposing of equipment wash waters. **Do not apply by ground equipment within 25 ft of lakes, reservoirs, rivers, permanent streams, estuaries and commercial fish farm ponds** (FMC 2004)
Product Tempo SC - Cyfluthrin 11.8 % 1 lb/gal EPA# 432-1363 **Methods**: Ground **Site**: Ornamental trees	This pesticide is extremely toxic to fish and aquatic invertebrates. Remove from premises or tightly cover fish tanks and disconnect aerators when applying indoors where such containers are present. Do not apply directly to water or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not apply when weather conditions favor drift from treated areas. Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment wash waters (Bayer 2004)

Table 2. Application and Site Information Permethrin

Parameter	Harpswell 1	Harpswell 2	Freeport
APPLICATION INFORMATION			
Product (EPA #)	Astro (EPA # 279-3141)	Astro (EPA # 279-3141)	Astro (EPA # 279-3141)
Dilution rate	6 oz./ 100 gal	6 oz./ 100 gal	5 oz./ 100 gal
Gallons used	25 gal	10 gal	50 gal
Adjuvant	Lesco Spreader Sticker	Lesco Spreader Sticker	No
Application equipment	hydraulic sprayer, nozzle size 16, 400 psi, 50 gpm max	hydraulic sprayer, nozzle size 16, 500 psi, 50gpm max	hydraulic sprayer, # 12 disk, 800 psi 20 gpm max

WEATHER PARAMETERS			
Wind speed	4.9 mph ave, 7.5 max	4.9 mph ave, 7.5 max	1.7 mph ave, 4 max (very calm)
Wind direction	off water	off water	toward water (target > 250 ft from water)
Humidity	79%	79%	96%
Cloud cover	light clouds, really no blue sky	light clouds, really no blue sky	light clouds, partly clear
SAMPLES TAKEN			
Singles	3	1	0
Duplicates	0	3	3
Triplicates	0	0	4
Field Blanks	0	0	missing
Total	3	4	7

Table 3. Application and Site Information; Cyfluthrin Sites		
Parameter	**Falmouth**	**Yarmouth**
APPLICATION PARAMETERS		
Product (EPA #)	Tempo SC (EPA # 432-1363)	Tempo SC (EPA # 432-1363)
Dilution rate	2 oz/ 100 gal	5 oz./ 100 gal
Gallons used	8 gal	15 gal
Adjuvant	Yes, Direct (polyvinal polymer)	No
Application equipment	hydraulic sprayer, nozzle size 14, 500 psi, 12 gpm	mist blower
WEATHER PARAMETERS		

Wind speed	calm, not registering on Kestrel	calm, not registering on Kestrel
Wind direction	from E, away from water	hard to tell at first but toward water (from NE)(treated trees were 250'from water)
Temperature	50 F	51 F
Humidity		86%
Cloud cover	full clouds	part clear
SAMPLES TAKEN		
Singles	1 (duplicate missing)	0
Duplicates	3	4
Triplicates	4	5
Total	8	9

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Results

A total of 22 samples were collected from the sites where hydraulic applications were made; Harpswell and Freeport were treated with Astro (permethrin), Tempo SC (cyfluthrin) was used at the Falmouth. Nine samples were taken at the Yarmouth site where Tempo SC (cyfluthrin) was applied with a mist blower. The major difference between hydraulic and mist blowers is as the names imply; hydraulic equipment uses water as the diluent and mist blowers use water and air. The latter allows a higher concentration in the use dilution.

Singles, Duplicates and Triplicates

Three of the four permethrin singles from Harpswell 1 were the result of several drift cards blowing away. The other permethrin single was from the Harpswell 2 site at the 100 ft mark. The single in the cyfluthrin data set was the result of a missing duplicate in sample D100b. One of the two field blanks collected was reported as missing by the lab. Statistical analysis was performed using Systat (1997).

The analytical results with accompanying statistics (where n = 2 or 3) are presented in Table 4. for Harpswell 2, Freeport, Falmouth and Yarmouth. Data where n = 3 used for risk assessment are in bold italics.

Risk assessment

The first step in the risk analysis was to determine if the laboratory detection limit was sensitive enough to determine if there is a concern. Back calculating from the LC50s, the ng/cm2 levels required to generate an Risk Quotient (Estimated Environmental Concentration/LC_{50} in Mysid Shrimp) of 1 are 0.28 and 0.036 ng/cm^2 for permethrin and cyfluthrin, respectively (Table 4). These calculations indicate that the laboratory analysis was not sensitive enough to detect cyfluthrin at the level of concern.

Table 4. Calculations of ng./cm^2 required for an Risk Quotient of 1

Compound	Laboratory Detection Limit		LC 50 Mysid shrimp (ng/L)	ng/cm2 where Risk Quotient [(b)] of 1
	ng mass	ng ai/cm^2 [(a)]		
Permethrin	15	0.06	19	0.28
Cyfluthrin	125	0.46	2.42	0.036

(a) ng active ingredient mass/ 268.8 cm^2 (filter paper area)
(b) Risk Quotient = Estimated Environmental Concentration (EEC)/ LC_{50}

The next step was to determine the degree of variability in the data. The number of valid samples (duplicate or triplicate) was low, with a total of 26 samples. The triplicate samples 50 ft

from the target area were statistically evaluated and the results are presented in Table 5. The range for individual filter papers at the 50 ft downwind line for permethrin in Freeport was 17.43 to 253.2 ng/cm^2. The median was 97.1. The means, standard deviations and coefficients of variation are presented in Table 5. The coefficients of variation (CV) range from 33.8 % to 66.8 %.

Table 5. Freeport, ng/cm^2 Permethrin from the 50 ft sample line

	n [(a)]	**ng/cm^{2}ave [(b)]**	**SD [(d)]**	**CV [(d)]**
Upwind	3	0.07	0.04	52.7
Downwind a	3	183.00	62.00	33.8
Downwind b	3	33.00	22.00	66.8

(a) n = number of filter papers in sample
(b) assuming non-detect = ½ detection limit (0.03 ng/cm^2)
(c) SD = Standard deviation
(d) CV = Coefficient of variation (Standard deviation expressed as percentage of the mean)

Conclusions

The issues with the current study include insufficient duplication, a high degree of variation, the existence of only 1 field blank (the second field blank was lost) and the fact that the equipment and chemical choice combination varied from site to site. Quantitative risk assessment to aquatic invertebrates based on the current data set is impossible.

The average upwind samples from the Freeport site plus the standard deviation is equal to 0.11 ng permethrin/cm^2 . This is below the level where the risk quotient is 1; 0.28 ng/cm^2 (Table 4.). Qualitatively, this indicates that the 50 ft buffer with the wind coming off the ocean appears to be adequate for protection of the marine resources.

The Board of Pesticides Control's Environmental Risk Advisory Committee met on September 13th to discuss this study. Invited guests included: Marty Folsom and Bill Raleigh from Lucas Tree Company and Patrice McCarron from the Maine Lobstermens' Association. Following discussion of the drift study required by 22 MRSA § 1445 and it's limitations (i. e. variability, insufficient replication), the conclusion was reached that the 50ft buffer appears to be adequate for protection of the water resources provided the wind is off the ocean and the spray is directed away from the water.

The consensus of the ERAC and the invited guests was to ask the legislature to take two actions:

1st To extend the current law 22 MRSA § 1445 for another year with the following modifications:

§ 2. Add "mist blowers" to list of equipment between 50 and 250 ft
§ 2.D Add "and wind speed is greater than or equal to 3 mph"

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§ 4. Add an exemption for "non-powered equipment used by appropriately certified and licensed applicators"

2nd To sunset the amended statute on March 31, 2008 in order that there would be time for the Board to incorporate the above protections for marine resources in regulation.

The committee also wanted to include a recommendation that the legislature sponsor an educational program for homeowners in the affected (BTM) area to prevent irresponsible pesticide use and to emphasize possible alternatives for the zero to 50' zone: clipping, pheromones, tree injection, hiring an appropriately certified, licensed applicator etc.